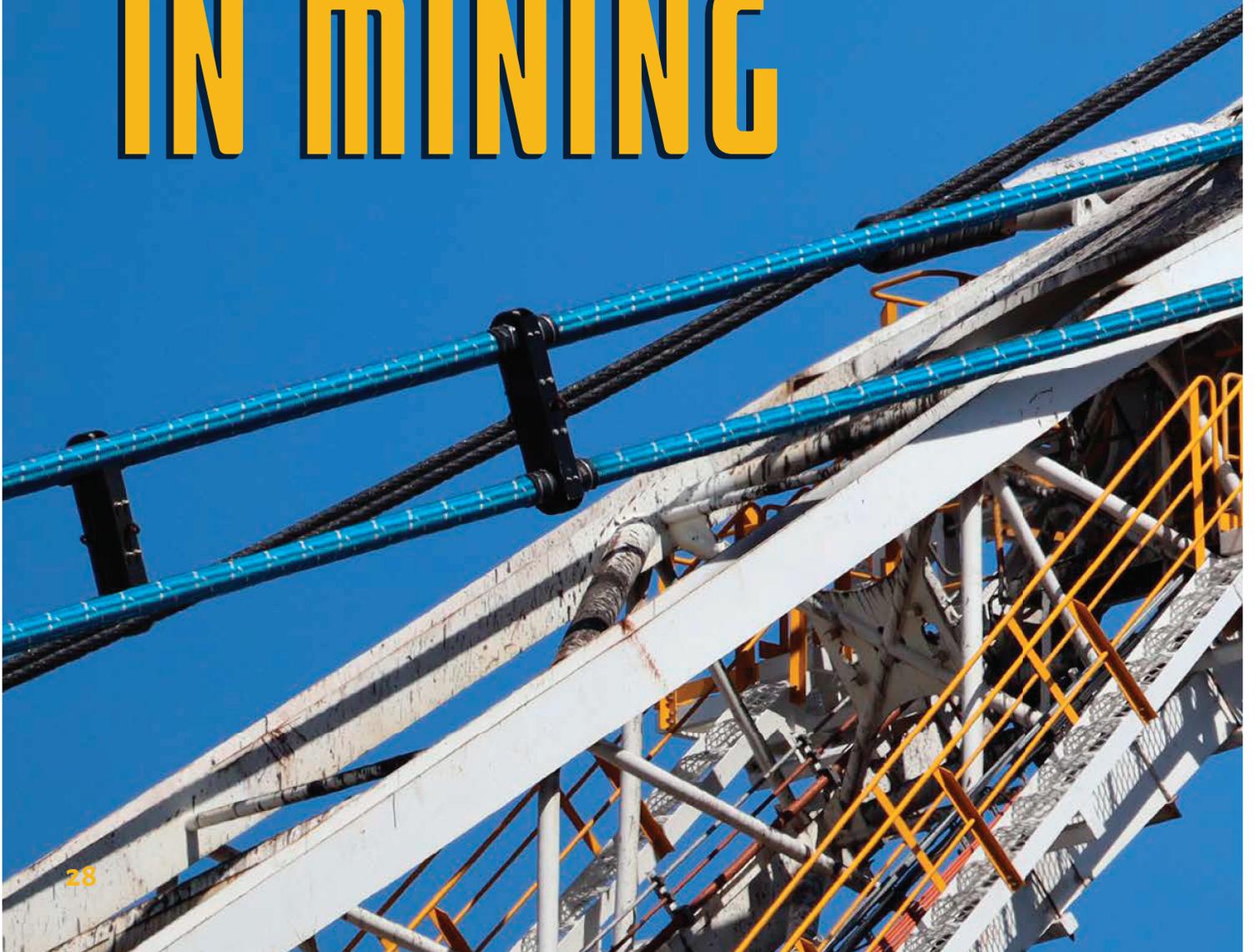


PAVE THE WAY FOR INNOVATION IN MINING



Troy Rybicki, Bridon Bekaert, USA, reviews the advantages of fibre rope boom suspension pendants, highlighting their substantial weight reduction, damping properties, reduced metal fatigue, and extended operational lifespan.

Figure 1. 8050 Dragline boom tip with Tiger Blue Pendants.



For decades, draglines have been the workhorses of coal surface mining operations, tirelessly moving vast amounts of earth to extract this valuable resource. These mammoth machines have played a pivotal role in shaping the mining industry and, while they have been in use for decades, innovation and technological advancements have been relatively scarce in their design and operation.

Applied Fiber has developed technology which has helped benefit the industry, and, combined with Bridon-Bekaert Tiger Blue Synthetic pendants, has been touted by a dragline superintendent as one of the best modern advancements for draglines.

While visiting mines and understanding draglines and their operations, it was learned that dragline owners have long been challenged with ongoing issues relating to maintenance and welding their massive boom structures. Metal fatigue from repeated cycling has been an accepted cost of doing business and is only addressed through downtime and welding maintenance, which add up to huge costs for the mines.

What if?

If the weight in the system could be reduced, and metal fatigue cycles lowered, what would that do to the performance of the dragline? What if capacity could also be increased?

The answers were clear. . . achieving these goals would have a huge, positive economic impact and production benefit to mines.

Applied Fiber recognised that reducing catenary weight of the massive boom support structure would help reduce the boom compression cycling, thus reducing the burden on the equipment. In addition, it was noted that a weight reduction in switching from steel mains to fibre mains would provide additional opportunity to increase capacity or reduce RSL.

It is within this context that fibre rope boom suspension pendants with advanced termination sockets designed for fibre have made their mark over the past eight years. These advanced terminations have allowed for the utilisation of high-performance synthetic fibres to help the draglines and electric rope shovels operate smoother than ever before, not only providing a reliable



Figure 2. Shock damping fibre pendants on 4100 Shovel.



Figure 3. 4100 Shovel in Australia with Tiger Blue Pendants.

means to support to the massive boom, but also bringing a number of new benefits to the machine.

The advent and adoption of fibre rope boom suspension pendants signifies a willingness to embrace innovation, and promotes ideas to continue to advance mining technologies.

As draglines continue to play a vital role in coal surface mining, this innovation paves the way for the integration of new technologies and it is why many dragline and shovel operators are converting to fibre.

For example, Mike Bayens, Field Engineer at Bekaert, recently accompanied a maintenance superintendent to see the Tiger Blue Fiber pendants for himself at another customer's mine in Australia. Upon approaching the dragline from a distance, the superintendent did not think the machine was running because there was virtually no movement in the pendants – usually steel pendants are very active and bouncy. He remarked the pendants are so still that there is hardly any movement, and wished he knew about them sooner.

By embracing this new technology, mining operations can unlock a host of benefits, including: enhanced productivity, reduced maintenance costs, and improved equipment uptime.

Benefits

Reduction in maintenance and 70% reduction in welding

The implementation of fibre rope boom suspension pendants has proven to be a game-changer, in terms of maintenance requirements, for earthmoving equipment. Due to the reduction in bouncing and damping properties, the fibre imposes greatly reduced levels of metal fatigue, stress, and strain on a machine's components. A mining company that has run these pendants for several years noted a 70% reduction in welding. The welding on the machine was never really looked at as an area where improvements could be made, and while the pendants were added to increase capacity along with a larger bucket, a review of the welding logs since the pendants were installed in 2018 noted a reduction in welding as compared to having the steel wire pendants. As a consequence, the need for maintenance, repairs, and welding on the equipment was drastically reduced, translating into substantial cost savings and uptime.

Damping benefits and reduced metal fatigue

Fibre rope boom suspension pendants provide an exceptional advantage in damping properties compared to their steel wire counterparts. When subjected to shock and vibration, fibre ropes exhibit greater resilience and elasticity, absorbing the energy more effectively. As a result, the vibrations transmitted from the working end of the boom to the metal frame and structure of the equipment are significantly reduced. This damping effect helps protect the equipment from excessive wear

and tear, ultimately leading to a reduction in metal fatigue, reducing cracking and welding which has been an accepted norm until now. Additionally, operator ergonomics is a key benefit. Indeed, current mines have reported that their operators prefer how machines run considerably smoother with the fibre pendants, as opposed to steel.

Weight savings over steel pendants and potential for payload increase

The weight savings of fibre dragline pendants over steel strand pendants is considerable, and this benefit can be seen by how the fibre pendants do not bounce compared to the steel. The reduction in weight and fatigue stress imparted on a dragline's boom has allowed several mine operators to increase their payload and still benefit from a reduction in maintenance.

Extended lifespan and equipment uptime

The first set installed, now running over eight years, has surpassed the life of steel by 50% already and is still going strong. It has been well documented in laboratory testing that the advanced fibre used in these pendants has 100 times longer life than steel in tension-tension fatigue testing. Applied Fiber's terminations are engineered to withstand and last the life of the fibre ropes. It is no surprise that the fibre rope boom suspension pendants are providing extended lifespan compared to steel wire pendants. This longevity allows mining operations to

utilise the equipment for a more extended period, without the need for premature replacements or repairs.

Furthermore, the extended lifespan of fibre rope pendants enables mines to defer the costly downtime associated with boom laydowns. The process of laying down a boom for maintenance or repairs is a time-consuming and expensive endeavour, resulting in a loss of productivity and increased operational costs. By utilising fibre rope boom suspension pendants, the frequency of boom laydowns can be significantly reduced, thus a high-risk safety event is less likely, resulting in increased productivity and cost savings for mining operations.

Cost savings and return on investment

The aforementioned benefits demonstrate how fibre rope boom suspension pendants can result in cost savings and a strong return on investment (ROI) for mine operations.

Conclusion

The adoption of fibre rope boom suspension pendants for draglines and electric rope shovels demonstrates the mining industry's willingness to embrace innovation and leverage advanced technologies. With reduced maintenance costs, improved productivity, improved safety, and enhanced equipment uptime, mining operations can achieve greater efficiency and sustainability – driving the industry forward into a new era of progress and success. 



Got a strange problem?

Voith Turbo offers straight service.

Okay – we don't normally treat animals. But when it comes to drive technology, we are true specialists. Our service experts stand for fast trouble-shooting and are close to you worldwide. So that you can fully focus on your core business, Voith supports you as a full-service provider with comprehensive services – regardless of whether

it is your own or a third-party brand. In this way, we extend the service life of your vehicles and machines and ensure their maximum availability. And if you do have a lion that is lovesick – we'll be happy to take a look at it, too.

voith.com/turbo-service

VOITH